The Real Estate ANALYST

JULY 29
1957

APPRAISAL BULLETIN

Volume XXVI

Number 32

Real Estate Economists, Appraisers and Counselors

DEPRECIATION IN RESIDENTIAL BUILDINGS

ONE of the least scientific aspects of the field of real estate appraising is the matter of depreciation. There are almost as many theories as there are theorists, and the average appraiser, no matter how conscientious or studious he may be, finds it necessary to fall back on that old standby, seasoned judgment based on years of experience.

It is not surprising that this is the case. In view of the many complex problems associated with the topic of depreciation, one might possibly assume that the problem is insoluble. Even on the most precise phase of the problem, physical wear and tear, there is no uniformity of opinion. There are those who still insist that the economic life of the average single-family residence is 40 years, while others will point to 100-year-old neighborhoods, where the properties are still serving an economic use.

In March 1953 our research department completed a study, the purpose of which was to discover rates of depreciation as applied in the individual appraisals being made by our appraisal department. Many thousands of individual appraisals in the St. Louis area were analyzed in order to determine the average rate of depreciation being used for a property of a given age. The results of the initial study were published in the March 1953 "As I See It" Bulletin. Our research department has just completed a similar project, adding to the original body of data a great many appraisals that have been made over the ensuing years. This survey varied from the 1953 project in that separate studies were made as to physical depreciation and functional obsolescence. Economic obsolescence was not considered because, generally speaking, it is not a function of age.

It should be stated at the outset that we are not so egotistical as to assume that the average of the decisions of our appraisers necessarily indicates correct rates of depreciation. On the other hand, each of these appraisals includes consideration of the market value approach. Where both the summation and market data approaches are considered, a fairly reliable estimate of overall depreciation will result, unless the appraiser is far afield on his replacement cost estimate.

All appraisals of properties of a given age at the time the appraisal was made were grouped together. First, a median average was taken of the figures representing physical depreciation only. Next, a second median was constructed of all those cases including physical depreciation and functional obsolescence. Of course, the number of cases of the latter increased with increasing age. When these two sets of averages were charted in a scatter diagram, it became obvious

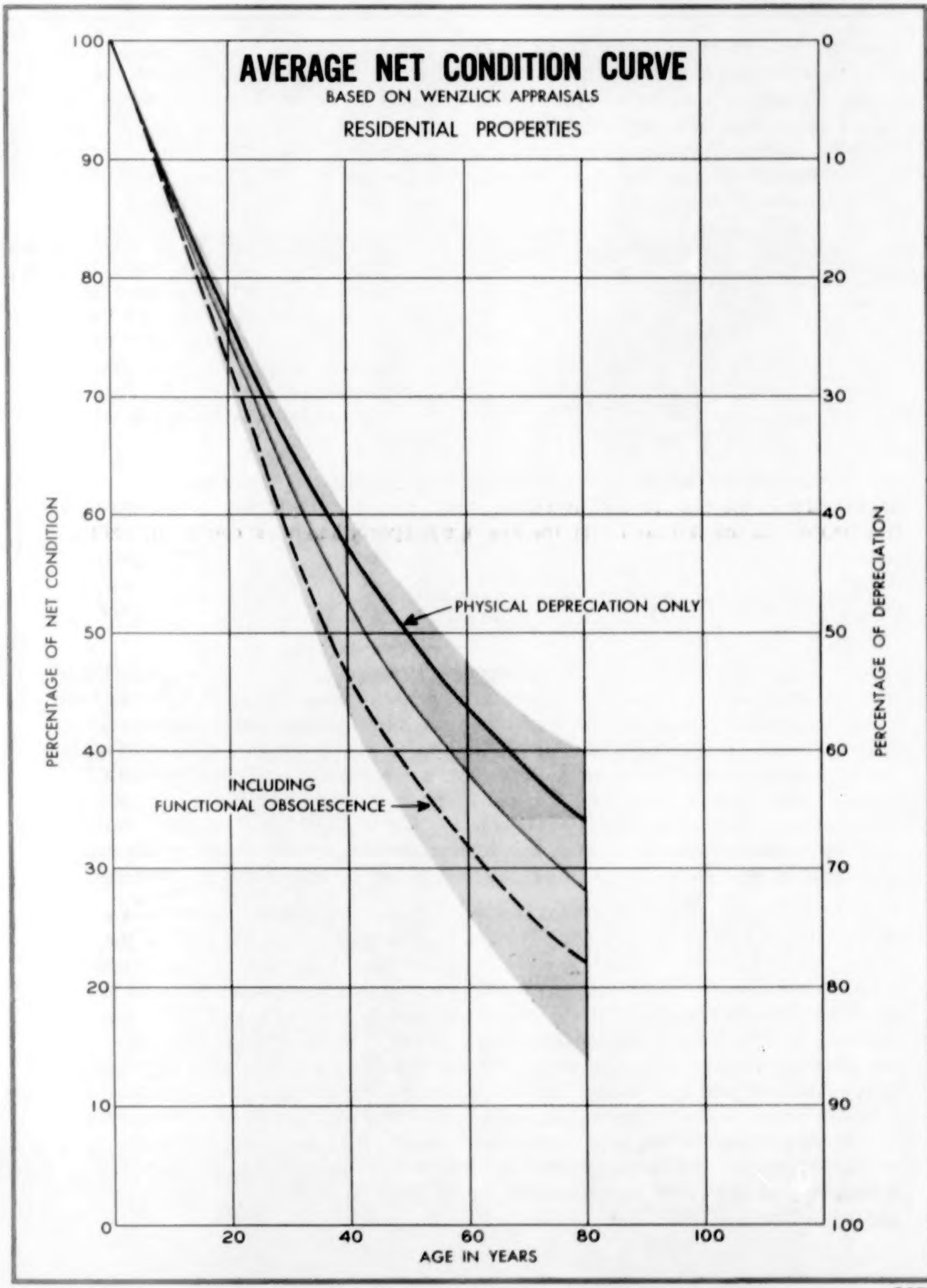
that they represented a curvilinear pattern. There being no mathematical formula for a relationship of this type, average curves were fitted to the data by the visual process. The chart on page 337 shows the curves resulting from this analysis, reversed so as to portray net condition. Depreciation at any one point, therefore, can be found by reading the scale shown on the right of the chart, whereas the reading taken from the scale on the left represents percentage net condition, or remaining worth.

The shaded bands lying on either side of the charted lines represent the range covered by the actual data. The variation shown in this manner provides a more usable depreciation guide. Properties poorly located and with above-average functional obsolescence for age should fall in the lower portion of the red band. Properties in average neighborhoods with some remodeling may belong in the upper part of the red band. On the other hand, where extensive remodeling has removed functional obsolescence and possibly a degree of physical deterioration, the percentages taken from the blue band would apply. We are, of course, again calling on the appraiser's judgment in making this selection.

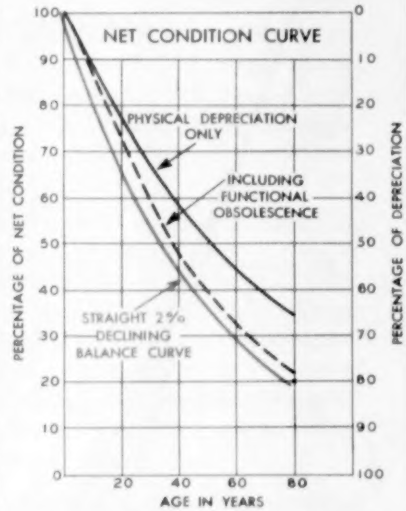
It will be noticed that for the first 30 years of the life of a property the rate of depreciation, whether or not functional obsolescence is included, is on a straight line basis. In the thirtieth year the average property has a net condition, excluding functional obsolescence, of 66%. This is at an annual rate of 1.13%. Including functional obsolescence, the net condition at the end of 30 years is 60%, or a loss in value of 40%. This amounts to 1-1/3% per annum. From the thirtieth year on, the annual rate of loss declines in both categories.

After constructing these lines of average depreciation based on our experience in many thousands of individual appraisals, we were interested to discover how these figures compared with some of the recognized depreciation schedules. The most familiar, and perhaps the least reliable system where older properties are concerned, of computing depreciation, is by the straight line method. While the straight line method is still widely used, it is very difficult to defend in the light of actual experience. As the chart on page 337 indicates, there is, on the average, a tendency for residential buildings to depreciate at a lessened rate as the property ages. This has resulted in the adoption of the declining balance system.

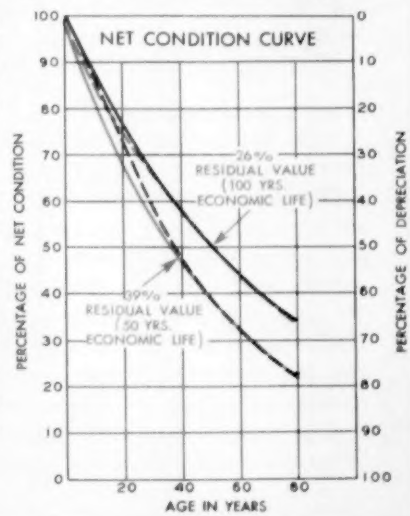
Stated simply, the declining balance system of depreciation adheres to a standard annual rate of loss, as does the straight line method. In the case of the declining balance system, however, the standard rate is applied to the remaining balance or net worth each year, rather than to the entire replacement cost of the structure. For example, if the replacement cost of a structure is $100, and the rate of depreciation 2%, the first year's depreciation would amount to $2. The second year's depreciation, however, would be only $1.96, that is, .02 x ($100 - $2). In the straight line system the second year's depreciation would also be $2, as would each succeeding year until the property had been completely depreciated. For those who like to dabble in mathematics, the formula for obtaining the accrued amount of depreciation after a given period of time under the declining balance system is $D = 100 - (1 - r)^n$, where D is the accrued amount of depreciation after n years and r is the annual rate of depreciation.


AVERAGE NET CONDITION CURVE
BASED ON WENZLICK APPRAISALS
RESIDENTIAL PROPERTIES
PHYSICAL DEPRECIATION ONLY
INCLUDING FUNCTIONAL OBSOLESCENCE
PERCENTAGE OF NET CONDITION
PERCENTAGE OF DEPRECIATION
AGE IN YEARS
100
90
80
70
60
50
40
30
20
10
0
20
40
60
80
100

On the chart to the right we have drawn a curve representing the net condition at any given time, based on a 2% declining balance formula. It seems apparent that those following the declining balance system are either allowing too much depreciation in the early years of the life of a property, or too little in the latter years, depending on what rate of depreciation is used. A depreciation schedule based on a 2% declining balance method provides for excessive depreciation in the early years, with the difference running as much as 6-7% in the twentieth and twenty-first years. This same curve, however, appears to be in line with actual experience from the fiftieth year on. It seems obvious, then, that if a new curve were drawn for a lesser annual rate of depreciation, which might be in closer agreement in the earlier years, the amounts of depreciation taken in the declining years of a property would be insufficient based on actual experience.



There is a system, using a variation on the declining balance method, utilizing a residual value and a definite economic life, which seems to offer a greater degree of accuracy. To the best of our knowledge this formula, which is commonplace in the field of depreciating assets in accounting practice, is little used in the real estate appraisal profession. The mathematical formula is $X = C\left[1-\left(\sqrt[n]{\frac{J}{C}}\right)^h\right]$. In this formula, X = the accrued depreciation after h years, C the replacement cost new, n the total economic life, and J the residual, or scrap value at the end of n years. In an attempt to fit curves to those developed by our own research, we experimented with several combinations. Those that seemed to describe actual experience the closest are a residual value of 39% and an economic life of 50 years for that curve including functional obsolescence, and 26% residual value and 100-year economic life for that curve based on physical depreciation only. While the latter (see chart opposite) is a very close fit, the former would tend to overdepreciate properties in the early years.



The results of our research project as reported here, do very little to put the subject of depreciation on a more scientific basis. They do, however, shed some light on the subject from the standpoint of actual experience. On this basis they may prove helpful, first to those who are faced with the problem in their daily work, and second to those few scholars who are attempting to discover something more of the nature of the beast.

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